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Review Article

Incidental maxillary sinus findings in patients referred for head and neck CT angiography ☆

Christopher G.T. Lim[a,*], *Manfred Spanger*[a,b]

[a]*Box Hill Hospital, Eastern Health, Victoria 3128, Australia*
[b]*Monash University, Australia*

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ABSTRACT

Background: Maxillary sinus pathology is a common finding on routine CT scans of the head and neck. The purpose of this study was to assess the incidental findings in the maxillary sinus on CT scans in patients who presented for head and neck CT angiography.
Study design: Images of patients referred for head and neck CT angiography were reviewed over a 5-month period. All maxillary sinus incidental findings were recorded and categorised into mucosal thickening, polypoid mucosal thickening, partial and total opacification. The age and gender of the patients and the side of mucosal pathology was also recorded.
Results: A total of 262 CT scans were reviewed (524 maxillary sinuses). Seventy-two patients had pathological changes (27.5%), 44 (16.8%) had mucosal thickening, 20 (8.0%) had polypoid thickening, 6 (2.3%) had partial and another 7 (2.7%) had complete opacification.
Conclusions: There is a high rate of undiagnosed maxillary sinus pathology incidentally found on CT scans. Clinicians reviewing head and neck CT scans such as dentists, general medical practitioners, maxillofacial and ENT surgeons should be vigilant and aware of maxillary sinus disease when interpreting CT scans of the maxilla and patients should be followed up appropriately.

Contents

☆Institution where work was performed: Box Hill Hospital, Eastern Health, Nelson Road, Box Hill, Victoria 3128, Australia.

*Corresponding author.
E-mail addresses: krissolimmo@gmail.com (C.G.T. Lim), manfred.spanger@easternhealth.org.au (M. Spanger).

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1. Introduction

Since its introduction in the 1970s, computer tomography has become an important medical imaging tool used in the detection, prevention and screening of disease. It is a widely and readily available investigative tool in most medical centres in developed countries. Furthermore, smaller machines such as cone-beam CT scanners are becoming more popular in private facilities. Due to this, more incidental findings are found on routine imaging. CT findings in the maxilla such as mucosal thickening and polypoid lesions are common in the general population. Pathological findings in the maxilla are important to clinicians such as dentists, maxillofacial and ENT surgeons as it may impact on the patient's medical status or treatment planning in surgical procedures. Dental and maxillofacial implants are potentially placed close to the mucosal layer and often this layer is augmented or manipulated during such procedures. Maxillary pathology may impact on the patients airway function and can also be malignant. This study aims to evaluate the prevalence of incidental findings in the maxillary sinus in a group of patients who were referred for head and neck CT angiography.

2. Material and methods

The images reviewed were acquired through the hospital image database and was searched for patients who had CT angiography of the head and neck at Box Hill Hospital, Eastern Health, Victoria, Australia. These referrals were for radiological investigation for arterial and cerebrovascular disease unrelated to their maxillary sinuses. The CT scans examined the carina to the vertex and were viewed in 2 mm axial and coronal slices with all scans reviewed by the same individual with experience in reading facial CTs and an experienced radiologist. The period examined was between June 2011 and October 2011. Only head and neck angiography with contrast CTs were reviewed and cases which had incomplete viewing of the maxillary sinuses were not included.

The age and sex of patients were recorded and patients were arbitrarily grouped according to the following age brackets: 18–29, 30–49, 50–69 and 70 and above.

The incidental findings were classified as mucosal thickening, polypoid mucosal thickening and partial and total opacification. Mucosal thickening was any thickening of more than 1 mm in at least one wall of the maxilla (Fig. 1). Polypoid lesions were defined as homogenous round opacities with distinct demarcating boundaries at the base (Fig. 2) while partial opacification was defined as at least one-third of the maxillary sinus being opacified without clear distinct boundaries (Fig. 3). Complete opacification was a completely opacified maxilla in all axial and coronal slices (Fig. 4).

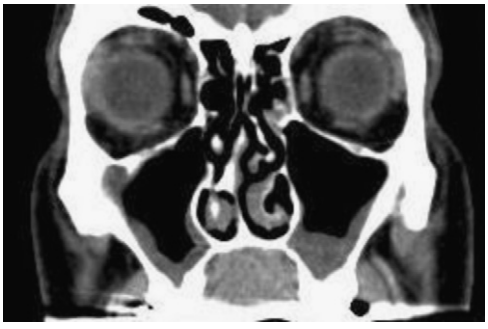

Fig. 1 – Mucosal thickening more than 1 mm thick and on more than one wall in both maxillary sinuses.

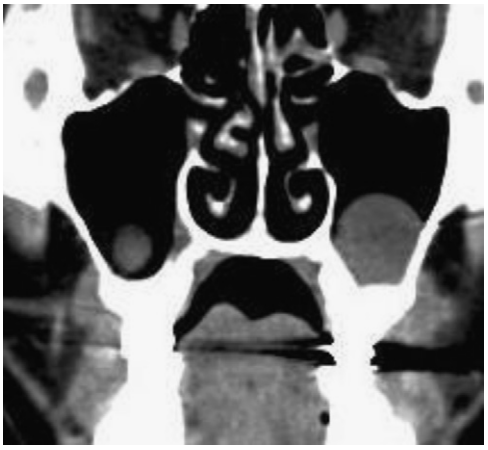

Fig. 2 – Bilateral round, polypoid and distinctly demarcated lesions in both maxillary sinuses, more evident on the left.

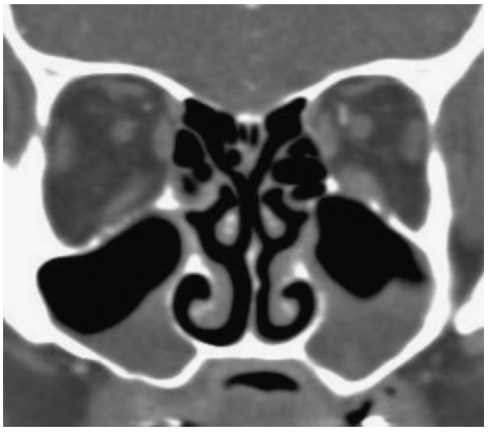

Fig. 3 – Partial opacification in both maxillary sinuses.

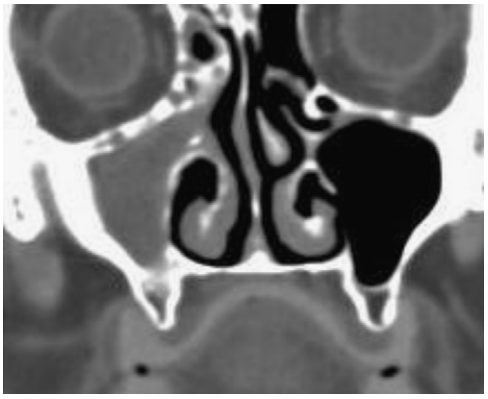

Fig. 4 – Complete opacification in the right maxillary sinus.

Any conflicting views were resolved with discussion and consensus.

3. Results

A total of 262 CTs were reviewed. The age range of patients was between 23 and 100 and the average being 67 years. The largest age group was over 70 and consisted of 121(46.2%) patients.

Maxillary sinus pathology was found in 72 patients (27.5%). Forty-four patients (16.8%) had mucosal thickening of which 19 (7.3%) had this occurring bilaterally. Nasal polyps were seen in 20 patients (7.6%). Bilateral polyps existed in 5 (1.9%) of these patients. Six patients (2.3%) had partial and 7 (2.7%) had complete opacification of the sinuses. Several patients had more than one finding (Table 2).

No correlation was found between age groups and sinus pathology. There were similar findings throughout age categories for all pathology except for the 18–29 group as this cohort had limited numbers (Table 1).

4. Discussion

Seventy-two patients (27.5%) had maxillary sinus pathology on CT which was within the range of previous reports [1–3]. The most frequent finding was unilateral or bilateral mucosal thickening which was present in 16.8% of patients. In previous studies the prevalence of this cited on CT scans has been between 24.9% and 83.2% [1–3]. Irritation of the maxillary sinus mucosa is presumed to cause this phenomenon and is most likely due to acute or chronic mucosal infections. Odontogenic factors have been implicated and reported to be the main factor in 10–12% of cases of maxillary sinusitis [4]. The slightly lower incidence in our study may be due to demographic and age factors. Furthermore, the definition used for mucosal thickening may not be consistent with previous studies as we defined this as more than 1 mm thick on at least one sinus wall.

Polyps or were found in 20 patients (7.6%). Previous studies have defined these on CT scans as mucous retention cysts and report an incidence of 12.4–22% [5,6]. They are assumed to be an extension of mucosal thickening and are also caused by irritation of the sinus mucosa from chronic infection. Kanagalingam et al. found no statistical significance of dental disease and polypoid mucosal thickening [8]. In several reports these were not shown to be symptomatic and treatment with surgery was largely unnecessary [7,8].

Opacification was an infrequent finding consistent with previous reports [2,9]. In the current study, 5.0% of patients had either complete or partial opacification in one or both sinuses. Although inflammatory disease is assumed to be the likely diagnosis, other differentials should be ruled out such as fungal sinusitis and neoplastic disease. Chen et al. found a 5.1% incidence of malignancy, 10.4% benign tumours and a 29.3% fungal disease in his series of unilateral opacification [10]. Kaplan et al. found a high incidence of mucoceles and nasal polyposis in complete unilateral opacification in patients who underwent endoscopic sinus surgery [11]. In a series of 1118 CT scans reviewed of the maxillary sinus, Ahsan et al. [9] found 28 with complete opacification with 12 of these patients being further diagnosed with neoplastic disease. In a similar study by Rudralingam et al. [12] 6 out of 20 cases of opacified sinuses on CT were malignant. These CT findings should prompt further follow up and investigation to rule out malignancy.

5. Conclusion

The maxillary sinus should be evaluated carefully in all CT scans as incidental findings are prevalent. Clinicians such as dentists, general medical practitioners, maxillofacial and ENT surgeons should be aware of sinus pathology. They should be

Table 1

Age group	18–29	30–49	50–69	70+
Male	0	9	63	81
Female	3	16	49	50
Total	3 (1.1%)	26 (9.9%)	112 (42.7%)	121 (46.2%)

Table 2

	Total[a]	Unilateral		Bilateral	18–29	30–49	50–69	70+
		L	R					
No finding	190							
Mucosal thickening	44	11	14	19	1 (33.0%)	5 (19.2%)	18 (16.1%)	20(16.5%)
Polypoid mucosal thickening	20	9	6	5	0	4 (15.4%)	10 (8.0%)	6(5.0%)
Partial Opacification	6	1	1	4	0	0	4 (3.6%)	2(1.7%)
Total Opacification	7	2	4	1	0	0	4 (3.6%)	3(2.5%)

[a] Total number of patients who could each have either unilateral or bilateral sinus pathology.

particularly aware of CT scans which show complete opacification of the maxillary sinuses which may represent malignancy. A comprehensive radiological examination will allow the clinician to make appropriate referrals if significant sinus pathology is seen.

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